

# **Least Cost Planning Guidance**

**WSDOT**

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## LEAST COST PLANNING GUIDANCE

### PURPOSE

“Least cost planning” is a strategy for optimizing infrastructure investments, originally developed in the electrical utility industry. The Northwest Power Planning Council in the late 1980s and early 1990s developed a program with this label as an approach to achieving the most environmentally sensitive yet cost-effective investments in new power infrastructure.<sup>1</sup> This generated interest in the Washington State Legislature.

In 1994, the Washington State Legislature passed SHB 1928 (codified as RCW 47.80.030) requiring Regional Transportation Planning Organizations (RTPOs) to develop regional transportation plans based on a least cost planning methodology. The implementing Washington Administrative Code (WAC 468-86-080) adopted in May 1997 required that the Washington State Department of Transportation provide least cost planning guidelines to RTPOs.

Two RTPOs, the Puget Sound Regional Council and the Island County sub-region of the Skagit-Island RTPO have incrementally addressed least cost planning without waiting for written guidance from WSDOT.

The current PSRC least cost planning analysis can be found in Appendix B on page 27 at: [www.psrc.org/assets/2127/09-45\\_BenefitCostAnalysisMethods.pdf](http://www.psrc.org/assets/2127/09-45_BenefitCostAnalysisMethods.pdf)

The other RTPOs have generally not addressed this topic in depth. Since the largest RTPO, the PSRC, has already researched this issue and adopted a program that meets its own needs, WSDOT decided to address only the 13 remaining smaller RTPOs.

### STATUTE

The Washington Administrative Code states:

#### **468-86-080**

#### **Least-cost planning methodology.**

The methodology shall consider direct and indirect costs and benefits for all reasonable options to meet planning goals and objectives. The methodology shall treat demand and supply resources on a consistent and integrated basis. The regional transportation planning organizations shall consult the guidelines set forth by the department for implementing a least-cost planning methodology. Regional transportation plans should incrementally incorporate least-cost planning methodologies as these concepts are developed. The regional transportation plan adopted after July 1, 2000, shall be based on a least-cost planning methodology appropriate to the region.

[Statutory Authority: RCW 47.80.070 and SHB 1928, Section 5. 97-09-046 (Order 169), § 468-86-080, filed 4/15/97, effective 5/16/97.]

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<sup>1</sup> Least Cost Transportation Planning: Lessons from the Northwest Power Planning Council, Sheets, Edward W. and Richard H. Watson, January 1994

## DEFINITION

Least cost planning, in its fullest sense, could be defined as:

A planning analysis that identifies the most *cost-effective, multimodal project* and *program* investment strategies, while taking into account *supply and demand, full life cycle costs* and project and program *externalities*. (Definitions of the italicized words can be found in Appendix 2.)

However, as we explain later, we recommend treating least cost planning when applied to transportation, as a version of benefit-cost analysis. Benefit-cost analysis is a methodology long employed for evaluating transportation projects and strategies.

## STATEWIDE CONTEXT

The Washington State Department of Transportation is using a form of least cost planning as its current strategy, *Moving Washington*. WSDOT's approach to an efficient and cost-effective surface transportation system in the state includes:

- Adding capacity strategically, which means to build or alter lanes and roads, targeting locations that reduce congestion.
- Operating efficiently, which means taking steps to smooth traffic flows and avoid or reduce situations that constrict roads. Efficient operation often uses traffic technology such as electronic tolling, traffic management centers, traffic cameras, variable message signs, and ramp meters.
- Managing demand, which means promoting and sponsoring travel options for commuters that result in greater efficiency for the transportation system, for example, convenient bus service, incentives to carpool or vanpool, or promoting workplaces that allow telecommuting.

## RELATIONSHIP OF LEAST COST PLANNING TO BENEFIT-COST ANALYSIS

In preparing to research least cost planning for PSRC in 1995, PSRC's consultant, ECO Northwest concluded that:

“When making the transition from energy to transportation least cost planning becomes benefit-cost analysis. In particular, the characteristics of urban transportation are such that one cannot plan by attempting to minimize cost for a simply stated service objective: one must look at the benefits for different types and levels of service as well.”<sup>2</sup>

For guidance on benefit-cost analysis, the most complete and current source is a Federal Highway Administration (FHWA) primer, found at:

[www.fhwa.dot.gov/infrastructure/asstmgmt/primer05.cfm](http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer05.cfm)

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<sup>2</sup> ECONorthwest, February 1995, Least-Cost Planning for Transportation, A Proposal, page 1-3

RTPOs applying a formal quantitative methodology are referred to the FHWA primer for methodology guidelines. For RTPOs wishing a simpler and more qualitative approach, WSDOT suggests using the following checklist to develop the transportation plan. The checklist questions are generally already part of the RTPO planning process.

#### **LEAST COST PLANNING CHECKLIST FOR USE IN PREPARING REGIONAL TRANSPORTATION PLANS**

1. What are this Region's objectives for this transportation plan?
2. What are the performance measures that indicate the RTPO has optimized its plan?
  - Region-wide
  - In specific sub-areas, if appropriate
3. What alternatives were developed initially for this plan?
4. How were the plan's alternatives refined and evaluated?
5. How were the following factors addressed in creating and evaluating these alternatives?
  - Life cycle costs
  - Multiple modes
  - Demand projections
  - Supply side limitations
  - Externalities
6. How were startup capital and lifetime operating costs weighed against results?
7. Did the planning process use benefit-cost analysis, and if so, what method(s) and what were the results?

#### **RECOMMENDATIONS**

WSDOT recommends RTPOs, as a minimum, provide a brief discussion and documentation of least cost planning in their regional transportation plan development, using either the FHWA primer or the checklist.

## APPENDIX 1 -- FURTHER READING

Boarnet, Marlon G. and Andrew F. Haughwout (2000), *Do Highways Matter? Evidence and Policy Implications of Highways' Influence on Metropolitan Development*, Brookings Institute ([www.brookings.edu](http://www.brookings.edu)).

Beimborn, Edward and Robert Puentes (2003), *Highways and Transit: Leveling the Playing Field in Federal Transportation Policy*, Brookings Institute ([www.brookings.edu](http://www.brookings.edu)).

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Crowley, Walt, et al (2005), *Moving Washington Timeline The First Century of the Washington State Department of Transportation, 1905-2005* ([www.washington.edu/uwpress/search/books/CROMOV.html](http://www.washington.edu/uwpress/search/books/CROMOV.html))

DeCorla-Souza, Patrick; Brian Gardner, Jerry Everett & Michael Culp (1999), *A Least Total Cost Approach to Compare Infrastructure Alternatives*, Transportation Modeling Improvement Program, FHWA ([tmip.fhwa.dot.gov](http://tmip.fhwa.dot.gov)).

ECONorthwest, *Case Study: Testing Application of Integrated Transportation Planning Methods on System Level Evaluation*, Puget Sound Regional Council and US Department of Transportation, Federal Highway Administration, 1996.

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FCM (2002), *Timely Preventive Maintenance for Municipal Roads - A Primer*, National Guide to Sustainable Municipal Infrastructure ([www.infraguide.ca](http://www.infraguide.ca)).

FHWA (2002), *Economic Analysis Primer*, Federal Highway Administration ([www.fhwa.dot.gov/infrastructure/asstmgmt/primer.htm](http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer.htm)).

FHWA, *National Dialogue on Transportation Operations* ([www.ops.fhwa.dot.gov/nat\\_dialogue.htm](http://www.ops.fhwa.dot.gov/nat_dialogue.htm)).

Goodwin, Phil (1997), *Solving Congestion, Inaugural Lecture for the Professorship of Transport Policy*, University College London (London; UK) ([www.ucl.ac.uk/~ucetwww/pbginau.htm](http://www.ucl.ac.uk/~ucetwww/pbginau.htm)).

Henson, R., & Essex, S., *The Development, Design and Evaluation of Sustainable Local Transport Networks*, UNESCO, **55**(176), pp. 199-233, 2003.

*Integrated Transportation Planning: A Primer for Policy Makers*, Puget Sound Regional Council, 1995.

IIEC (1996), *The Integrated Transport Planning Beginner's Handbook*, International Institute for Energy Conservation ([www.iiec.org](http://www.iiec.org)).

ISF (2003), *Least Cost, Greatest Impact: A Discussion Paper On The Applicability of Least Cost Planning To Transport In Australia*, Institute for Sustainable Futures, University of Technology Sydney ([www.isf.uts.edu.au](http://www.isf.uts.edu.au)).

Johnston, Robert A. and Raju Ceerla (1995), *Effects of Land Use Intensification and Auto Pricing Policies on Regional Travel, Emissions, and Fuel Use*, Paper 269, University of California Transportation Center ([www.uctc.net](http://www.uctc.net)).

Litman, T., *Least Cost Transportation Planning: Creating an Unbiased Framework for Transportation Planning*, Victoria Transport Policy Institute. ([www.vtpi.org/tdm/tdm21.htm](http://www.vtpi.org/tdm/tdm21.htm)).

Litman, Todd (2001), *What's It Worth? Life Cycle and Benefit/Cost Analysis for Evaluating Economic Value*, Presented at Internet Symposium on Benefit-Cost Analysis, Transportation Association of Canada ([www.tac-atc.ca](http://www.tac-atc.ca))

Litman, Todd (2005), *Win-Win Transportation Solutions: Cooperation for Economic, Social and Environmental Benefits*, Victoria Transport Policy Institute ([www.vtpi.org/winwin.pdf](http://www.vtpi.org/winwin.pdf)).

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Lyles, Ward (2005), *Where Do We Go From Here? Wisconsin Transportation at the Crossroads*, 1000 Friends of Wisconsin & The Land Use Institute ([www.1kfriends.org/documents/1KFriendslegislat\\_001.pdf](http://www.1kfriends.org/documents/1KFriendslegislat_001.pdf)).

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Mozer, David (1999), *Least Cost Transport Planning*, IBF ([www.ibike.org/lcp.htm](http://www.ibike.org/lcp.htm)).

NGA (2004), *Fix it First: Targeting Infrastructure Investments to Improve State Economies and Invigorate Existing Communities*, National Governors Association ([www.nga.org](http://www.nga.org)).

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Rufulo, Anthony M.; Luis Martin Bronfman; James G. Strathman; Edward L. Hillsman, and Steven R. Elliot (1996) *Least Cost Transportation Planning in ODOT Phase 2 – Final Report*; Oregon Department of Transportation ([www.oregon.gov/ODOT/TD/TP\\_RES/docs/Reports/LeastCostTransPhase2.pdf](http://www.oregon.gov/ODOT/TD/TP_RES/docs/Reports/LeastCostTransPhase2.pdf)).

## Appendix 2 - Definitions

*Cost-effective* means getting the most return for the money invested, when all considerations (not just direct project or program benefits) are taken into account.

*Externalities* mean the cascading dependent consequences or side effects of a given investment or program. Before NEPA was enacted in 1969 (i.e. before Environmental Impact studies were required), few if any attempts were made by most transportation agencies to examine externalities. They can be loosely considered as the same as unintended downstream consequences.

*Life Cycle Costs* mean the full combined capital and operating costs of an investment, including ongoing maintenance and the sinking fund required for capital replacement and the end of its useful life. For instance, a bus lasts about 10 years, whereas a bridge may last 50-100 years. Both require ongoing maintenance to keep them in safe and serviceable shape, but the bus will need full replacement much sooner. On the other hand it is cheaper in the first place. Life cycle cost calculations require some assumptions about the life expectancy of the investment and inflation in maintenance costs over future years. A good life cycle cost program should conduct periodic asset condition studies to determine whether the remaining expected life of the facility is still the same as estimated at the outset, or has been reduced due to unexpected wear. Such a program will also examine replacement costs and whether they have inflated faster than originally expected.

*Multi-modal* synonym for intermodal, multimodal transportation covers all modes without necessarily including a holistic or integrated approach.

*Project* means a transportation infrastructure facility requiring construction, such as rail line, highway link, bridge, maintenance facility, underpass, tunnel, culvert, roundabout and so on.

*Program* means a transportation management or operating investment such as regional bus operations, Transportation Demand Management, Commute Trip Reduction and similar operations, along with their subordinate activities such as carpool matching programs, vanpool programs, traffic light synchronization programs, parking management programs and the like. Programs may also require some construction, but the construction (such as overhead variable messaging signs on a highway) creates a tool for running the program, rather than being the service in and of itself.

*Supply and Demand Sides* means considering demand management solutions equally with strategies to increase capacity. For example; transit improvements, congestion pricing (such as tolling) and HOV lanes are considered equally with road and parking increases.